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ON THE GEOGRAPHICAL DISTRIBUTION OF THE EUROPEAN AND CAUCASIAN BISON.*

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THE narrow limits of this article preclude any mention of the Bison in prehistoric times. Such information concerning it as history affords has been already collected by Brehm in his 'Tierleben.' In remote historic times it was to be found not only in Central Europe, but in Spain, throughout Pannonia, and in Thrace, where the Cossack-like Pæonian hunters were transformed into centaurs by Greek travellers' tales.†

Frequent wars, especially the devastating Thirty-Years War, drove these animals out of Germany further north and east; their numbers diminished, the cows being often barren for three or four years.‡

In Pomerania the last one was shot by Duke Wratislaw V. about the middle of the 14th century, and one of its horns was used first as a drinking-cup, and then as a reliquary in the Cathedral of Cammin.§

When Henry IV. of England visited Prussia in 1390-91, a Bison and two Bears were presented to him ('Preussisches

* Translated from the German in 'Der Zoologische Garten' (Frankfurt-a-M.), 1894, pp. 13-17, 48-49.

† Gaudry, 'Verfahren der Säugetiere in Europa,' p. 169; Keller, 'Tiere des Klass. Altertums,' pp. 53, 56.

‡ 'Neue Deutsche Jagd-Zeitung,' v. p. 307; Günther, 'Der Harz,' p. 582; 'Zoologische Garten,' vol. ix. p. 64; xviii. p. 229; xxi. p. 219.

§ 'Zoologische Garten,' viii. p. 307; xiv. p. 113; 'Zeitschrift der Gesellschaft für Erdkunde, Berlin,' xix. p. 402.

Jahrbuch,' 1892, p. 303). The breed survived for some time in the pine forests of Johannesburg, together with Elk, Bears, and wild Horses;* but no mention of it occurs in the hunting literature of the 16th and 17th centuries, while in the 18th century Fleming ('Der vollkommene Teutsche Jäger') and Döbel ('Neu eröffnete Jägerpraktike') only briefly allude to it as having entirely disappeared from Germany by the end of the previous century.

Lithuania, of which the ancients had some knowledge (see Pallas, 'Neue Nordische Beiträge, I. p. 1, and my observations on *Bonassus* and *Bos* in the Index to Aristotle published by the Berlin Academy in 1870), was then the only district in the north which sheltered it, as mentioned by Baron von Herberstein in a much-contested passage.† Besides the authors mentioned in my Essay, I quoted Wiegmann's 'Archiv für Naturgeschichte,' 1839, pp. 75—78; 1841, pp. 55, 56; 1847, p. 225; Erman's 'Archiv,' 1852, pp. 30—40; 'Die Gartenlaube,' 1860, p. 725; 'Neue Deutsche Jagd-Zeitung,' v. pp. 289, 297, 306, 314; vi. p. 134, &c. Schiller Tietz, in his brochure 'Inzucht und Consanguinität,' has expressed the view held by many that animals which are confined in a comparatively small space will diminish in size. For example, the Bison is said to have formerly weighed as much as 1000 kilos., but now only from 500 to 600 kilos.

According to the 'Neue Deutsche Jagd-Zeitung' (xiii. p. 196), Bison in the forest of Bialowicza generally weigh about 600 kilos., and several weighed 20 cwt (v. p. 307). Formerly they were 7 ft. high, 10 to 12 ft. in length, and weighed from 19 to 22 cwt. One killed in 1595 by Johann Sigismund of Prussia weighed 19 cwt., or 100 lbs. less than our old friend in the Berlin Zoological Gardens.‡ The cows, which are not fully matured until they are

* Hagen, 'Geschichte des preussischen Auers,' 1819.

† Carus, 'Geschichte der Zoologie,' p. 337; 'Zoologische Garten,' viii. p. 3.

‡ The way in which deer and other wild animals were formerly weighed may be illustrated by the following quotation from an article by J. E. H. on the Hunting Trophies in the German Exhibition of 1891 ('The Field,' July 4th and 18th, 1891):—"Here also we may note two other objects which figure in the old paintings above referred to, and which perhaps served as actual models to the artist—namely, the *game weighing-machine* and the *game-carrier*. The former may be described as a cross-beam supported on



six or seven years old, weigh considerably less. Reports as to the weight of these animals date from a few centuries back, but are very scattered even at the present day.

Under these circumstances, is it right to assume that a diminution in size has been caused by in-breeding amongst many hundred of these animals in such an extensive area as that of Bialowicza?

In our Zoological Gardens the conditions for many of the animals are quite different. Omitting all description of the structural and osteological details, I will only allude to Baumer's Essay of 1824, in which he attributes to the Bison two ribs more than are possessed by the domestic cow. See Owen, Proc. Zool. Soc. 1848, p. 129, and Dolmatoff, ib. iii. p. 48. Ludwig ('Neue Deutsche Jagd-Zeitung,' v. p. 325) and others have written about its horns ('Die Natur,' 1888, p. 215). According to Dr. A. Nehring, *Bison europæus* has a shorter and more shapely metatarsus than *Bos primigenius*.* The skulls of their American relative are said to make comfortable seats in Indian wigwams, and those of the Urus and Bison were used by the European pile-dwellers of old; for, as Victor von Scheffel sings in 'Gaudeamus':—

"If I build my small hut in the open
The Aurochs will stamp it to pieces."

Bison skins were used for clothing in the earliest times, and in Hungary in the 17th century were appropriated to various purposes.

Wild, the head forester at Pless, observed that the cows were in heat at all seasons and were invariably covered by the oldest bulls. The period of gestation is 274 days, and calves are born at all times of year, doing well even when there is 20° of cold.

It has often been said that there is such antipathy between the Bison and the domestic cow that they will not interbreed,†

high trestles, through which passes an iron bar terminated by a large hook. From this hook the deer was suspended by all four legs lashed together, and raised from the ground by a windlass until its weight was indicated on a scale. The *game-carrier* consists of a couple of fir-poles laid horizontally about a yard apart, with a hammock of strong netting lashed between them. On this the stricken deer was laid and transported."—Ed.

* 'Zeitschrift für Ethnologie,' xx. p. 222.

† Eichwald, 'Beschreibung von Littauen,' p. 87.

and that the former is untamable;* but Count Walicki has proved the contrary by crossing the Bison with his Swiss cows.

Old Sulzer, in his 'Geschichte des transalpinischen Daciens,' 1781 (i. p. 71), gives an account of a bull Bison "with a long mane and short legs," which followed a cow into her stall on several evenings, an incident which Brehm rightly attributes to "amorousness" overcoming natural dislike. Brehm also alludes to the Bison gradually becoming tame, and following people for food, as at Bialowicza for example; while Count Franz Lazár reported that in 1740 (or as others say in 1770) he drove to the Diet at Hermannstadt with a beautiful team of Bison from the Gyergyóer Forest.†

Whether the *indomiti boves* driven by Oriental princes were Bison or wild cattle is uncertain. In Clothair's time the King drove with oxen to the public assemblies. The Gothic rulers even drove stags,‡ and so late as the beginning of the present century a head forester near Stettin had a team of four of these animals.

Bison were for a long time to be found in the Hungarian Siebenbürgen. 'Der Weidmann,' quoting from a work by Stefan König ('Die Geschichte der Jagd in Ungarn'), which was shortly to appear, states that the last Bison was killed by a clever crossbow shooter in the forest of Sohl, Upper Hungary, in the reign of King Mathias (1458—1490); according to Alex. von Ujfalvy, the last was killed at Borgo on the Play Höhe in the Siebenbürgen in 1762; while others report that in 1775 some still existed in the Udvárhelyer Komitat.

Sulzer (*op. cit.* p. 54) states that Prince Kantemir in describing Moldavia mentioned an animal called *Zimbr* (i. e. *Zubr*), which neither he (Sulzer) nor any one else had seen, and which might have been a Buffalo (*ein Büffel*). Eichwald at first supposed that a record of the year 1582 of "*Zumbro bestiæ feræ in Tauro-scythia*" had reference to the Crimea, but afterwards translated

* Oscar Schmidt, 'Die Säugethiere,' p. 169.

† 'Neue Deutsche Jagd-Zeitung,' xiii. p. 176; and 'Der Weidmann,' xxiv. p. 432.

‡ See Carus, 'Geschichte der Zoologie,' p. 35; and Victor Hehn's well-known work, pp. 40, 41, 61, 109.

Tauroscythia to mean Moldavia.* Edward von Czynk assigns a much later period for the existence of the Bison in the forests of Csik, Udvárhely, and Gyergyó, giving 1814 as the year of the last one's death in the Siebenbürgen.†

Numbers were said to inhabit the Gyergyó mountains in 1534, and even a century later.

Mecklenburg has an ox's head on its coat of arms; the family of Count Was in Hungary a Bison's head; while the Lazár family above referred to bears upon its shield a Bison pierced by an arrow. We may add that a print published by Anton Wied of Danzig in 1555 represents a Urus (Bison) being killed with a long spear.

In the Russian empire the Bison is only found wild in two districts. To deal first with the most easterly, the story of the Argonauts and their fire-breathing bulls (reminding one strongly of the Greek account of the African Gnu) is probably the earliest mention of the Bison in the Caucasus, that difficult country to cross, which entirely blocks the narrow strip of land which separates the Black Sea from the Caspian. I imagine these "fire-breathing" animals to be Bison, whose defiant eyes when angry become glowing red.‡

The earliest reliable information about this animal dates probably from the year 1633, when mention is made of wild Buffaloes on the borders of Abkasia.§

The fact that so little has been heard of the animal since that time may be accounted for in two ways. Being very alert as well as very shy, and clever in hiding from its pursuers when once warned, it may have gradually withdrawn into the higher parts of the mountain range, where it would be safe. Fischer Sigwart, in his interesting little work on mountains as a refuge for wild animals,|| enumerates the European mammalia which eventually found there the only conditions favourable to their existence; the European Bison, which gradually died out, is not one of these. The Caucasian animal, however, found a cool retreat there in

* 'Beiträge zur Kenntniss des russischen Reichs,' 1883, vi. p. 16.

† 'Neue Deutsche Jagd-Zeitung,' xiii. p. 196; 'Zoologische Garten,' 1889, p. 281.

‡ Keller, 'Tiere des Klass. Altertums,' p. 57.

§ Eichwald, 'Beiträge zur Kenntniss des russischen Reichs,' vi. p. 16.

|| 'Das Gebirge ein Rückzugsgebiet für die Tierwelt'

summer, being able to climb as well as an Elephant. Travelling Russians who passed through the country left it unnoticed; nay, even denied its existence, or considered it extinct, having found dozens of its horns amongst those preserved in old churches of Swanetia, which are now regarded as treasure-houses, and are under the care of the state. Many travellers, however, have confused the horns of the Bison with those of *Ægoceros pallasii*.*

In Cæcasiæ, as in Europe, the horns were used as drinking-vessels. At a feast given by a Caucasian noble in honour of General von Rosen, the table was graced with seventy Bison-horns richly set in silver. Nehring, by the way, states ('Neue Deutsche Jagd-Zeitung,' vii. p. 370) that a single horn holds barely 4 litres of liquor, much less than is contained by a horn of *Bos primigenius*. From a skin obtained by General von Rosen, both Brandt (Bull. Soc.-Nat. Moscow, 1866) and Von Baer have judged the Caucasian Bison to be specifically identical with the Lithuanian animal.†

The theory advanced by Ussow in the 'Proceedings of the Imperial Russian Acclimatisation Society,' 1865, and by Koch ('Reisen durch Russland,' ii. p. 70), that the Bisons of Cæcasiæ and Lithuania are specifically distinct, is therefore no longer tenable.

In the 'Verhandlungen der Gesellschaft für Erdkunde,' Berlin, 1881, p. 38, we find a statement to the effect that Bison are still to be found "in some parts" of the above-mentioned mountains. Let us examine this more closely. Von Thielmann, in 1877 ('Streifzüge im Kaukasus,' p. 108), located their original home in the watershed of the river Kuban, whence they probably wandered into Abkasiæ; this accounts for their being known there as *dombai*, *dombe*, or *adompe*. Gustav Radde (Zool. Garten, 1891, p. 320) does not confirm the statement that the Bison was smaller here than in Lithuania; and that indefatigable explorer had good opportunities for observing the beast which inhabited

* 'See 'Ausland,' 1888, p. 803, and Oliver Wardrop, Proc. Geogr. Soc. London, 1888, p. 807.

† 'Neue Deutsche Jagd-Zeitung,' xiii. pp. 55, 116; 'Zoologische Garten,' vii. p. 350; ix. p. 216; Von Middendorf, Reise IV. ii. p. 1048; Petzholdt, 'Der Kaukasus,' p. 164. An amusing mistake occurs in a French translation of Brandt's paper, wherein his statement that the animal was found in herds (in *Rudeln*) is rendered "dans une localité nommé Rudeln"

the district, when he visited the glacier heights of the Marucha Mountains, near the Pass of Nachar, on his way back from Elbruz in 1865.* On his last journey through the district surrounding the sources of the Laba and Bjellaja, north of the Caucasus, and thence to the source of the Selentschück, he found Bison, but everywhere in small numbers, not more than two or three together, and on one occasion traces of seven. The arrival of fresh colonists had caused them to forsake their settled habits, and to take to wandering. He frequently met with them, however, about the source of the Little Laba, and especially near the western tributary Uruschtem, and the small lake of Alaus at an altitude of 7-8000 feet. Some thirty or forty years previously they had been found at a height of 5000 feet. The whole district of about 525,000 hectares has been under imperial control since 1860, but it is very difficult to guard against poachers.† In the museum at Tiflis there is a unique and beautiful group, set up under Radde's supervision, which represents a fight between a Bison and a Panther.‡

In earlier times *Bison europæus* was probably distributed over the greater part of the forest zone within the present boundaries of European Russia, as well as on the steppes; but, like its North American relative, it has gradually disappeared, and is now confined (so far as Europe is concerned) to a single forest district in Lithuania. Augustus III. of Poland, Kurfürst of Saxony, made a reserve, some thirty square miles in extent, for Bison at Bialowicza, in the present government of Grodno, on the Prussian frontier, out of a forest which lay surrounded by desert steppes.§ Franz Müller (Mittheil. der Geogr. Gessels. Wien, 1859, p. 155) gives an exact plan of the whole area, which was enclosed by a strong wooden fence more than three metres high. In one place a stand was erected for the King and his distinguished guests, so that the sportsmen might be safely out of

* Petermann's 'Mittheilungen,' 1867, p. 13; 1868, p. 72.

† 'Deutsche Jäger-Zeitung,' xxii. p. 49.

‡ 'Jahresbericht des Vereins für Erdkunde,' Dresden, xv. p. 15.

§ 'Deutsche Jäger-Zeitung,' xxi. p. 287; Eichwald, 'Beiträge zur Kenntniss des russischen Reichs,' vi. pp. 137, 244; 'Zeitschrift für wissenschaftliche Geographie,' iii. p. 138 (*fide* Brandt); 'Zoologische Garten,' vii. p. 350; xiv. p. 21.

the way of the beasts they were to slay. Twenty paces from this stand was an opening in the fence, through which the animals were driven. There could be surely no great skill required in shooting at a driven herd from so short a distance, but merely the brutal enjoyment of killing a large number of animals—a trait which unfortunately is not yet extinct, as the massacres of modern times in North America and South Africa have shown. At the period referred to, on a great hunting day, forty-two head have been killed, of which the Queen alone killed twenty, and found time (it is said) to read a novel whilst waiting for the beaters to come up!

Statistics as to the number of Bison then existing are of a doubtful character. In 1829, 711 head were reported, including 633 adult animals; in 1830, 772; in 1831, 657; in 1853, 1543; in 1857, 1898; in 1866, according to a Government report, from 1500 to 2000, but according to the foresters, only 500; in 1882, 600; in 1886, 433; in 1889, 380; and in 1892, 491. The noticeable diminution of numbers, notwithstanding the large amount expended on their preservation, is due to untrustworthy management, the forest grant being unjustifiably appropriated, and poachers allowed to take what they liked. The responsible "woodwards" invented all sorts of diseases and epidemics to account for the disappearance of the game.

This tract of forest has now for some years belonged to the Apanage Department, and the numbers no longer decrease. A purely military guard has superseded the foresters.* After many experiments, mostly with negative results, any young motherless Bison, Elk, and Red-deer that are found are now brought up on cow's milk. For calves of from one to two months old this is mixed with an equal quantity of warm water, which is gradually diminished. After four months they take to bruised oats. As the milk easily turns sour, and is then said to cause intestinal inflammation, eight or ten teaspoonfuls of infused tea are added to each half-litre. The latest *protégés* of the superintendent, a fine strong bull Bison and four cows, were sent to Pless as a present in February, 1893.

From Bialowicza, as well as from the Caucasus, living

* 'Zoologische Garten,' vii. p. 350; 'Neue Deutsche Jagd-Zeitung,' vi. p. 134; x. p. 278; xiii. p. 186; 'Deutsche Jäger-Zeitung,' xx. p. 123; xxi. p. 127.

specimens have been forwarded to various Zoological Gardens, and dead ones sent to museums. The specimen in the Tiflis Museum has been already referred to; one was sent from Bialowicza to the Copenhagen museum, and a skin of another, killed by a Berlin animal painter at Bialowicza, was presented by the Czar to the Gottingen Museum.

In order to become acquainted with new haunts and higher feeding-ground the Bison must have been forced to quit their original haunts many years ago. Probably they were captured in the manner described by Pausanias (x. 13. 2), and transported to Rome to take part in the public spectacles of Domitian.

Voigt, in his 'History of Prussia' (i. p. 544), states that at that time both Bison and Elk were numerous in the forests of Prussia, and that both were occasionally caught and sold into foreign lands, including Italy. Polish nobles kept them in their parks at Ostrolenka, Warsaw, Zamosk, &c. Frederick III., Kurfürst of Saxony, sent for Elk and Bison from Lithuania, and established them in various deer-parks, as well as at Berlin. In 1689 they were turned out into the unenclosed hunting-ground, but did not flourish, and all attempts to make them do so proved unsuccessful.

In 1717 two were sent to the Landgrave of Hesse Cassel, but they also speedily succumbed.

The Prince of Pless owns the largest and most important game-preserve in which imported Bison are now to be found. About a century after the last Bison in Prussia had been killed by two poachers in 1755, the Prince of Pless re-introduced the species, sending the Czar some Red-deer in exchange for a three-year-old bull and three cows, which he turned into the great deer-forest of Emanuelsegen, six hundred hectares in extent. By 1874, some twenty years later, they and their descendants had wandered two miles southwards, into the district of Mezenzitz.* Later on fresh blood was introduced by the importation of other animals from Bialowicza. In 1885 the number of the herd was twelve, of which six were bulls, four cows, and two calves under

* See the Report on this park to 1890 by the head forester Wild, in 'Neue Deutsche Jäger-Zeitung,' x. p. 235; also 'Der Deutsche Jäger,' vi. p. 119; and 'Der Zoologische Garten,' vii. p. 350.

a year old.* In winter each animal receives 10 kilos. of good meadow hay with 2 kilos. of oats; now and then, instead of the latter, bark mixed with flour and meal are given. Trials of lupin and barley were not successful, as both digested badly.

The shooting of Bison by the Czar and by royal visitors is always duly reported in the sporting papers. The technical names for Bison in use at Pless are probably very ancient: *zeber* for bull, *zubszica* for cow, *czelen* for calf. In old German hunting terminology, the cow was *tier*, the calf *auer-kalb* or *tier-kalb*, the bull *hörner*, *gehörn*, *waffen*, and at Pless *aufsatz* (head-piece). None of these terms are included in Dombrowski's 'Deutsche Waidmanns-sprache.'

The animals in the park at Schönbrunn, presented by the Czar from Bialowicza, are said to have flourished and increased.

For a notice of the Bison in the Berlin Zoological Gardens, see Bodinus, 'Die Tierwelt des Zool. Gartens,' ed. 1871, p. 95, and 'Die Gartenlaube,' 1864, p. 710, with an illustration. The Bison in the Dresden Zoological Gardens did not come direct from Bialowicza, but from Schönbrunn, the Emperor Franz Joseph having presented a three-year-old bull and a two-year-old cow. The cow had a calf in 1860, but it was badly treated and finally trampled upon by its parents. A second calf survived. Only one cow is now to be found there, which was born in the seventies.

Bison were sent to London to George IV., and also in 1848 and 1860 to Queen Victoria, though the pair last sent did not come straight from Bialowicza, but had been kept at Grodno for a time.

In November, 1868, according to the latest 'List of the Vertebrate Animals,' a living European Bison was received at the Zoological Gardens of London, which was born in the Amsterdam Gardens on July 14th, 1865.

The Empress Katharine had long before received some in 1738, and a pair went to St. Petersburg in 1860, which had also been kept at Grodno for a time.

The Zoological Gardens at Moscow even possessed a Caucasian Bison, which was captured by Adjeff, near Ateikhar, and safely conveyed to Moscow with great difficulty on Dec. 19th, 1866. In the same year there was also one of northern origin there, received from the Zoological Garden of Gatschina.

* 'Neue Deutsche Jagd-Zeitung,' v. p. 814. It is erroneously stated in the 'Landwirth, Zeitung des Hamb. Korrespondenten,' 1884 (p. 54), that in this year the number rose to 80—40.

ON THE NAMES GIVEN TO THE MOLE.

BY PROF. HERBERT A. STRONG, M.A., LL.D.

THE Latin *talpa* for *stalpa*, and the Greek ἀσπάλαξ or σπάλαξ, both come from the root "scalp" and signify the "digger." The Latin shows *st* as against the Greek *sp*, cp. studium with σπεύδω; and for the disappearance of the *s*. cp. cutis with scutum.

The Italians received the word *talpa* and employed it to signify "a mole," but altered the word into *topo* to signify equally a rat or a mouse—an instance, as it seems to me, of their lack of observation of animal nature. They seem to have given the name of *topo* to the mysterious animals which came to them from the East in the third or fourth centuries, which received the name of *hratte*, our rat, from the Slavish name for mole, *krot*. It seems likely, from the fact that the Low German form *ratte* is more commonly used in German than the H. German form *ratze*, that the incursion of rodents may have skirted the Baltic and passed through Low German countries. The Russians, however, evolved another word for rat, *krysa*, and retained the old Aryan word for mouse under the form *muish*. The French discarded this root, and employed *souris*, from *soricem*. The Romansch of Dissentis retains the form *mur*.

Reverting to the Mole, the old Germans called it "earth-thrower," *mold-wurf*, Icelandic *mold-varpa*, which popular etymology soon turned into "maul-wurf," or "mouth-thrower." The Scotch form "moudie-wort" is well known. Palmer quotes Topsell's 'Historie of Foure-footed Beasts' (1608), p. 500, "With her feete she diggeth, and with her nose casteth awaye the earth, and therefore such earth is called in Germany *mal-werff* and in England molehill." In the west of England the word for mole is "want," which comes apparently from the same root as the modern German *wenden*, to turn, from the tortuous passages it makes beneath the earth.

Dr. Meyer, the Celtic scholar (my colleague), informs me that in the Celtic languages we find a variety of words for mole, but there is no one common Celtic term. The Brythonic branch has indeed one word common to all the languages which it embraces, viz. *gwadd* in Welsh, *gôz* in Breton, *gwdd* (or *ddaor*) in Cornish. But Edward Lloyd (1707) gives besides for Welsh, *twrch daear*,

literally "earth hog" or "earth-burrower," and he adds as obsolete terms *orddodyn* and *ylltyr*.

In Irish we have *caochán* (the blind creature), *criadh-luch* (the earth mouse), *luch dall* (the blind mouse). In Scotch Gaelic we find *famh* or *famh thalmasnn*, *ùir-fhamh*.

In Manx the mole is called *kyaghan-caochán*, *roddan-ooirey*, the earth rat, or *lugh-ghoal*, Welsh rat.

Palladius, who probably wrote about the reign of Theodosius in the 4th century A.D., gives directions for getting rid of the Mole as one of the banes of the agriculturist. An unknown translator, whose work is published by the Early English Text Society, gives the following quaint version of Palladius's injunctions:—

"THE MOLDEWARP THE GREKES THUS PURSUE:—

Thai thurle a nutte, and stuffe it so withinne
With brymstoon, chaf, and cedria, thees three.
Then alle her hooles the molde is ynne
Save oon, the moste, uppe stopped must thai be.
The fyred nuttes smolder shall thorowe fle
This grettest hoole, as wol the wynde him serve
And either shall thees talpes voide or sterve."

From another passage in this translation we see that the Mole was actually called the Mold, hence our word is evidently a corruption of that form.

Our friend Pliny does not tell us much about the Mole that is worthy of record. He affirms that these animals hear better when underground; that the magicians of Persia hold them in especial reverence; that they are killed by pouring "amurca" (wine-lees) into their holes; that mats were made of mole-skins; that they have no eyes; and that a town had been undermined by them. Virgil also believed them to be blind, and regarded them as one of the pests of the farmer.

In the 'Philosopher's Banquet' (1633), we are told that water in which Moles were boiled had the property of turning what was black to white!



ON BIRDS OBSERVED IN SOUTH WALES.

By O. V. APLIN.

THE recent appearance in 'The Zoologist' of a review of Mr. Mathew's 'Birds of Pembrokeshire,' and two very interesting lists of Welsh birds, *viz.*, Mr. Rawlings' list of the birds of the Barmouth district (p. 328), and Mr. Harold Raeburn's list of birds seen in Mid-Wales (including parts of Montgomery, Radnor, and Cardigan) in May, 1894 (p. 406), has suggested that perhaps a list of the species seen by me during a brief visit to Carmarthenshire in June last might be of interest for comparison with those above mentioned.

The scene of my observations was a valley, with its tributaries, and the low but steep mountains rising therefrom. The tops of these hills were not more than from 1100 to 1300 feet (about 1500 in some cases) above the sea-level. The sides of them were often very steep; the upper portions were rocky in places; the tops consisted of moorland, chiefly covered with grass, but here and there clothed with a little ling. A considerable portion of the hillside is covered with wood, consisting almost entirely of spruce and oak. In the lower parts, and along the stream and torrent banks, you find alder, birch, wych-elm, rowan, hazel, &c. The district therefore is suitable for woodland birds.

A few species were conspicuous by their rarity or absence. Foremost amongst these was the Spotted Flycatcher, although I had seen it just before on the banks of the Wye in Breconshire. Mr. Raeburn does not mention meeting with it in his tour in Mid-Wales. It is however reported as common at Barmouth (p. 330). The Grey Wagtail I did not happen to see, probably because the adult individuals of this species had betaken themselves to the smaller streams, which wind away among the mountains, to breed, and the young had not yet come down. But it was curious that I did not see a single Stonechat, though the ground was suitable for it. I find that Mr. Raeburn did not meet with it either. Yet it seems to be common in Pembrokeshire, as well as in North Wales. I have seen it on Penmaen-mawr, in Carnarvonshire, in July, and noticed a good many in Merionethshire in October, 1884. Mr. Rawlings says that, although resident and common in the Barmouth district, it is only

just recovering from the effects of the winter of 1889, when dozens of Stonechats were picked up dead. Possibly it suffered also in parts of Mid and South Wales. I did not hear a single Chiffchaff, and Mr. Raeburn does not appear to have noticed it (in May). But my companion observed one, and tells me he heard some in April. Yet it could hardly have been present and have become silent in June, for here in Oxon it sings on into the latter part of July. Perhaps the April birds moved on, though I cannot imagine why they should do so. I found the Chiffchaff common in North-west Shropshire, on the Welsh borders, in May, 1888, and have heard it on the Anglesea side of the Menai Straits in July. Mr. Rawlings notes it as common. I did not see the Nuthatch, a pair of which Mr. Raeburn found nesting; nor does Mr. Rawlings include it in his list. In Shropshire, near the Welsh borders, I have found it common in a well-planted park. The distribution of many of our small birds in Wales and the border counties is evidently very local, and it would be an interesting study to work it out. The Lesser Whitethroat must be a rare bird in Wales. Neither Mr. Raeburn nor I observed it, and it is either not found or extremely rare in Pembrokeshire, according to Mr. Mathew. But, curiously enough, Mr. Rawlings is able to include it in his list, as "much rarer" than the Common Whitethroat. Perhaps it is spreading from Salop to North Wales. I observed it at Ellesmere in May, 1888, and the late Mr. Beckwith wrote of it as common in that county, it having increased greatly of late years. The Green Woodpecker was not noticed by me, and Mr. Raeburn only heard it once in Radnorshire. This, again, is curious, when we consider what a noisy bird it is, and that I made the following note about it in Merionethshire, in October, 1884:—"Quite common in the woods, and I observed it even in the hotel garden." In Mr. Rawlings' list it is entered as "common." I did not expect to find many House Sparrows when I saw what the country was like, and I was not disappointed. We saw none until we approached a town again. But our landlord said a few came in harvest; I suppose to help him get in his little patch of corn! Mr. Rawlings omits the name from his list altogether. This is, possibly, an oversight. I found very few in Merionethshire in October, 1884, and those only about farms. There was no ground suitable for river warblers in the part of Carmarthen-

shire explored. But as Mr. Rawlings has an interesting note about the Grasshopper Warbler, to the effect that he first observed it six years ago, and that it is increasing annually, I may mention here that I observed it in May, 1888, on Whixhall Moss, a detached portion of Flintshire.

Here is my list; it includes fifty-four species, while Mr. Raeburn's includes sixty-one:—

Turdus viscivorus; *T. musicus*; *T. merula*.

T. torquatus.—A male, which strung together a few wild notes, and a pair, on rocky slopes. Bill of male dusky yellow.

Saxicola ænanthe.—Very numerous.

Pratincola rubetra.—Only one.

Ruticilla phœnicurus.—Quite common. Seen up the wooded heights to some distance; also on rocky faces to quite 1000 feet, if only there was a scrubby thorn or other bush, and reminding one of the Black Redstart in the Alps. The Redstart is unknown, or extremely rare, in Pembrokeshire (Mr. Mathew). From what little I have seen of that county I should expect many woodland species to be absent, as my remembrance is of a dreary, rather treeless country. But the Redstart is increasing so in some places that it may push its way into any suitable spots there may be in Pembrokeshire. In Shropshire Mr. Beckwith noted it as very locally distributed. I saw it at Shrewsbury and near the Black Mere in May, 1888, but my host considered it quite uncommon then. I do not know if it is more numerous now, but Mr. Raeburn found it abundant in most of the localities in Mid-Wales he visited, and Mr. Rawlings records it as very common in Merionethshire. Mr. Raeburn must have overlooked this when he stated (p. 406) that the authorities were silent as regards this bird in North Wales.

Erithacus rubecula.

Sylvia cinerea.—Fairly common.

S. atricapilla.—Two or three.

S. hortensis.—Several observed; in song. Extremely rare in Pembroke (Mr. Mathew). Fairly distributed (Mr. Raeburn). Rarer than the Blackcap (Mr. Rawlings).

[*S. curruca*.—Capt. Swainson writes that it is "pretty evenly distributed in suitable places in the neighbourhood of Brecon," and that he could point to at least a dozen different localities where it can be heard, and perhaps seen, near Brecon (Zool. 1891,

p. 356). There is a record of its breeding in one instance in Carnarvonshire (*loc. cit.* 1893, p. 395)].

Phylloscopus rufus.—*Vide supra*.

P. trochilus.—Abundant, and singing all day the full song. In Oxon they were singing chiefly in the early morning when I left. I found it very abundant in north-west Salop in May, 1888, and saw many in the birches and alders on the edge of Whixhall Moss.

P. sibilatrix.—Abundant, especially in the oak-woods. Mr. Rawlings records it as plentiful. Not in Pembrokeshire, or extremely rare there (Mr. Mathew).

Accentor modularis.—Only once seen by my companion.

Cinclus aquaticus.—On a tributary stream.

Acredula rosea.—A family party.

Parus major; *P. palustris*.

P. ater britannicus.—The commonest Titmouse.

Troglodytes parvulus.—Seen in the wildest places.

Motacilla lugubris.

Anthus pratensis.—Common. Found high up on the face of the hills and among the ling and rough grass at the top.

A. trivialis.—Common; extended some way up the sides of the hills.

Muscicapa atricapilla.—Apparently common. I saw two males, a pair, and two females. Here, as elsewhere, they take most of their food on the ground. But they occasionally take a fly on the wing, and sometimes among the branches of the tree they are perched upon. The song to me has generally a resemblance to that of the Whinchat, but is rather clearer and more sprightly; this is sometimes preceded by several notes, about four of them, somewhat like a Coal Tit's "if-he." Sometimes the song contains two or three notes a little like those in the first part of the Reed Bunting's chant; but these also are more sprightly and clear. The alarm-note of the female is a loud, full, and hard "chip," repeated continuously at a moderate pace. Captain Swainson remarks upon the similarity of some notes in the song to the spring note of the Coal Tit (*Zool.* 1892, p. 423).

Hirundo rustica.—Not very many. Seen some way up the hillsides.

Chelidon urbica.—A few seen about the rocky parts.

Cotile riparia.—Fairly common. Apparently breeds on the

hill-sides, as I saw some flying in that direction after picking up feathers in a farm-yard.

Carduelis elegans.—One pair in the lower valley.

Passer domesticus.—*Vide supra*.

Fringilla cælebs.—Very common, and sang the Wood-Wre prelude almost entirely or exclusively.

Pyrrhula europæa.—Once, in the lower valley.

Emberiza citrinella.—Some.

Sturnus vulgaris.—Only two or three seen.

Garrulus glandarius.—A few in the woods.

Pica rustica.—Three or four seen.

Corvus monedula.—Some about a small solitary church.

C. corone.—Common, especially on the hills.

C. frugilegus.—Some.

C. corax.—Twice saw a pair, and once a single bird; always on the hills.

Alauda arvensis.—Not uncommon on the moorland at the top of the hills.

A. arborea.—Apparently not uncommon in the lower valley. Observed two males singing in two low oaks, one on each side of a narrow lane. Two others seen. To my mind the song of this bird yields to none for beauty. For softness, sweetness, and restfulness it takes the palm. In delivery it is gentle and leisurely. Mr. Raeburn did not meet with the Wood Lark, and at Barmouth it has only occurred in winter (Zool. 1894, p. 331).

Cypselus apus.—Fairly common. Often overhead when I was on the highest ground.

Caprimulgus europæus.—Heard "churring" loudly on one wet evening.

Cuculus canorus.—Heard frequently.

Syrnium aluco.—One seen in a wood; heard hooting at night also.

Buteo vulgaris.—Several seen.

Milvus iclinus.—One seen.

Falco tinnunculus.—Several seen.

Ardea cinerea.—A magnificent old bird passed over my head, low down, as I was searching for a Sandpiper's nest one day. I never (except at the nest) had one fly so close to me before. I fancy he did not see me; but I was in the open—merely on a shallow underbank of the river, and I am sure no Oxfordshire

Heron would have failed to see me. Perhaps these Welsh birds are unsophisticated. I saw one more.

Columba palumbus.—Fairly common.

C. ænas.—Seen about the rocks, high up.

Crex pratensis.—One heard in the lower valley.

Totanus hypoleucus.—Several pairs. Very tame. They had probably hatched their young. I had seen tiny young following the old birds on the banks of the Wye in Brecon just before.

NOTES AND QUERIES.

MAMMALIA.

Wild Cat, Polecat, and Marten in Cardiganshire.—In November, 1893, a large cat was sent to Mr. Hutchings, of Aberystwith, to be preserved. It was shot upon the estate of Mr. T. M. Davies, of Pen-y-bont-pren, Talybont, and is now in his possession. I examined it in the full expectation of finding it to be a house-cat which had taken to the woods, or the descendant of one; but after careful comparison with books of reference, now I believe it to be a genuine example of *Felis catus*, as it appears to me to possess all the characteristics of that animal. It has the heavy, muscular figure, short limbs, and broad flat head of the wild species. Length, as stuffed, 30 in., of which the tail is only 8½ in. It is grey in colour, whitish beneath, with an irregular dark line, or perhaps two, extending along the back, and with regular transverse bands of black on the sides; yellowish about the face, tawny on the inner side of the legs, and feet black underneath. The tail is bushy and does not taper, ringed, and tipped with black. The keeper who shot it sent it to be preserved, as being quite unlike any cat that he had ever killed previously. I do not know the present status of the Wild Cat in Wales, and can only hope that the example referred to may be seen by some one better acquainted with that species than I am. But it is only comparatively recently that game-preserving has become at all general in the district in question, and it is not at all impossible that an animal, even of this size, might remain undetected. The Polecat, *Mustela putorius*, is still so frequently met with that its remains are to be seen upon every keeper's wall, and those sent into Aberystwith to be preserved would probably average one a week throughout the year. The Marten, *Martes sylvatica*, on the other hand, is all but extirpated. The only recent occurrence that I know is that of one in the possession of Capt. Geo. Weir Cosens, of Llanbadarn, which was sent to him about 1882, from a grouse-

moor on the slopes of Cader Idris, where it had lived for some years and caused much damage.—J. H. SALTER (University College, Aberystwyth).

Albino Weasel.—Referring to the enumeration of albino specimens of the Common Weasel which have been hitherto recorded (Zool. 1894, p. 449), I may mention that some time since Mr. J. Pettitt, taxidermist, of Colchester, showed me a specimen which had been killed near that place about Dec. 20th, 1892. It was pure white, with pink eyes, and the flesh was of the usual pale colour.—MILLER CHRISTY (Pryors, Broomfield, near Chelmsford).

CETACEA.

Hump-backed Whale on the Lincolnshire Coast.—The members of the family *Balaenopteridæ*, of which there are two well-marked genera, comprising the thick-bodied, large-finned Humpbacks (*Megaptera*), and the long, slender, small-finned Rorquals or Finner Whales (*Balaenoptera*), are distinguished by the longitudinal pleats or folds in the skin of the throat and belly, and by the possession of a dorsal fin. The head is relatively smaller than in the Right Whales, and the jaws are less arched; the baleen is short and twisted, the vertebræ of the neck are usually separate, that is, not ankylosed, and the flipper has only four fingers. The Rorquals, or some of them, are not very uncommon off our northern coasts, but the Hump-backed Whale (*Megaptera longimana*) is of such rare occurrence that, until the present year, four examples only have been recorded to have been met with in British waters since 1829, when the first was cast ashore near Newcastle-on-Tyne, in September of that year (Johnston, Trans. Newcastle Nat. Hist. Soc. vol. i.). No other example was met with until 1863, when a second was captured in the estuary of the Dee, and its skeleton having been prepared, is preserved in the Liverpool Museum. Again twenty years elapsed before a third was recognized, this time at the mouth of the Tay, in the winter of 1883—84 (Struthers, Journ. Anat. & Phys., 1887; and Flower, 'Mammals, Living and Extinct,' 1891, p. 242). After another interval of ten years, a fourth came ashore on the Enniscrone Sands, Co. Sligo, on the 21st March, 1893 (Warren, Zool. 1893, p. 188). We have now to chronicle the capture of a fifth example of this whale, which was stranded at Chapel, on the coast of Lincolnshire, about seven miles north of Skegness, during the first week of September last. Its identity was established by Mr. G. H. Caton Haigh, who on hearing of its capture went to see it, and found it in process of being cut up. He reported it to be a small specimen of its kind, about twenty-five feet in length, with a flipper seven or eight feet long and perfectly white; the rest of the body black, excepting a few white marks on the under side. Mr. Cordeaux, who reported the occurrence ('Naturalist,' 1894, p. 286), has referred to only three previous instances of its capture in the British Islands, and has

consequently overlooked one of the four above mentioned. Considering that it is a common species in the North Atlantic, between Norway and Greenland, it is curious that it has not been more frequently detected in British waters. It is of course possible, and indeed probable, that other examples have been captured or stranded, and cut up before any competent zoologist could see and identify the species. As regards the dimensions of the Hump-backed Whale, an adult specimen is said to attain a length of 45 to 50 feet. If so, the individuals which have come under the notice of naturalists in this country seem to have been all more or less immature. The Newcastle specimen was 26 feet in length, the Lincolnshire specimen 25 feet, the Sligo specimen 29 feet, and the Dee specimen 31 feet 4 inches. To judge from the dimensions given by those who have recorded these examples, the figure in Bell's 'British Quadrupeds' (which is copied from Rudolphi's original figure in the Memoirs of the Berlin Academy) conveys an erroneous impression of the proportions of the animal. In nature the body is very clumsy, and so thick as to look quite out of proportion to its length, being probably between 20 and 30 feet in circumference, according to Mr. Warren, who examined the Irish specimen. Again, the tail is represented as much too small in proportion to the length. The late Mr. T. Moore, of the Liverpool Museum, who measured the Dee specimen, found the extreme width of the tail to equal the distance from snout to flipper, namely, 11 feet; whereas in Bell's figure (copied from Rudolphi) the extreme width of the tail is not 4 feet. We want new outlines of this species, drawn from the latest statistics.—J. E. HARTING.

BIRDS.

Notes on Grouse.—On reading the recently published volume on the Grouse in Longman's 'Fur and Feather' Series, I was struck with the reference to a bird in my uncle's possession which Mr. Macpherson has decided to be a hybrid between Red Grouse and Black-game (*tom. cit.* pp. 62, 63). I am naturally familiar with the specimen in question, which I had always regarded as a barren grey-hen assuming male plumage. I refrained, however, from any expression of opinion, until I had had another opportunity of examining the bird. I am now writing this in the same house with it, and, after a careful examination, I must say I cannot find any grounds for altering my former opinion. The size of the bird, the appearance of its feet and head, exactly correspond with those of a normal grey-hen purposely put in the same case with it. The claws, and the serrations on the side of the toes, do not show the least tendency to resemble the same parts in a Red Grouse; neither is there a trace of Grouse-like feathering on the toes themselves. Nor can I detect any distinctive characteristics of Red Grouse plumage on the body. I have seen a good many examples of this abnormal female plumage in the

Capercaillie, Black Grouse, and Pheasant (all polygamous birds), at Christiania and elsewhere, and remain firmly of opinion that this present instance must be classed amongst them. I may add that there are no grounds (based on dissection) for calling it "a fine male," else I could only urge my point with extreme hesitation. It came from somewhere near Longtown, close to the border, and was bought at a game-dealer's shop in Carlisle by my uncle; and the sex, I regret to say, was not ascertained. I will send a description (as close as the case it is in will permit); if the Editor thinks it would be of interest. I feel compelled to take exception, also, to the suggestion that Grouse have not been known to undertake regular periodical migrations (*tom. cit.* p. 40). Grouse from different moors vary quite sufficiently in plumage and size to make it hardly worth while to wait for "marked birds." May I call Mr. Macpherson's attention to an undoubted case in his own county of Cumberland, mentioned in Clarke and Roebuck's 'Handbook of Yorkshire Vertebrates' *sub voce* "Grouse." I have examples in my collection of Cleveland Grouse shot (by myself) on a Cumberland moor, where they make their appearance regularly every year. Mr. Macpherson would do well to study the extent of this phenomenon on other moors as well; it would be likely to lead to results of great interest. Lastly, will Mr. Macpherson pardon me if I venture to suggest that it would have been well not to allow such expressions as "using his spurs" (p. 28), "with his spurs" (p. 29), to pass without some sort of protest.—
HENRY H. SLATER.

[To this communication Mr. Macpherson sends the following explanation.]

"Perhaps I may venture to supplement Mr. Slater's note with the necessary reminder that I had no opportunity myself of forming an independent opinion on the bird, which I do not remember exactly. The owner of the bird, Mr. Horrocks, is a good sportsman and naturalist, who had the bird in the flesh, and I accepted his *ipse dixit* for whatever it might be, considering at that time that he knew far more than I did about game-birds, which I had not then studied at all. Mr. Slater took no exception to the original record, so that I assumed that he concurred in his uncle's opinion, and I therefore copied the original record on two subsequent occasions. I was, of course, anxious to see the bird, but ill-health prevented my availing myself of its owner's kind invitations to his house. I am often asked to investigate the local migrations of Grouse in the North of England. It is useless, however, to attempt any enquiry of the kind, unless several owners or lessees of moors can be prevailed on to attach metal labels to a number of small Grouse. Even if such a course were seriously undertaken for a single season, we should learn a good deal. In the meantime, it seems to me that the mere theories of keepers on the subject are valueless. Nothing short of a system of marking birds, carried out on a

sufficiently large scale, can clear the matter up."—H. A. MACPHERSON (Victoria Place, Carlisle).

Black Guillemot in Merionethshire.—Amongst the sea-birds which fall victims to rough weather on the Welsh coast I found, on Nov. 11th, the much-damaged remains of a Black Guillemot, *Uria grylle*, washed ashore on the Traeth Bach, near Towyn-y-Penrhyn. Though, no doubt, frequently met with in former years, I know of no recent record of this species in Merionethshire.—J. H. CATON HAIGH.

Pomatorhine Skua in Mid-winter.—The great gale of December 22nd drove a fine Pomatorhine Skua up the river Eden, and it was shot from the Carlisle race-course. I have never before met with this Skua so late in the season.—H. A. MACPHERSON (Carlisle).

The Oystercatcher in Warwickshire.—The Oystercatcher, *Hematopus ostralegus*, is by no means a common visitor to the Midland Counties, nevertheless it occurs irregularly from time to time. In an old list in my possession of the birds recorded for Sutton Coldfield Park (a park of some 2800 acres, about 180 of which is water, distributed over six pools), the Oystercatcher is mentioned with doubt. On August 24th, 1890, I heard the whistle of these birds at dusk, from off the muddy flats of Longmore Pool. The next day they were still there, and five in number. On November 25th last, a single bird I found haunting the gravelly sides of Powell's Pool, both of which pools are within the boundary of the Park. Some other waders, such as the Green and Common Sandpipers, Ring Plovers, and Dunlins, constantly occur, but the Oystercatcher is, I think, of sufficiently rare occurrence so far inland as to be worth recording.—J. STEELE ELLIOTT (Dixon's Green, Dudley).

Nesting of the Lesser Spotted Woodpecker near Bath.—A few months ago a friend showed me his collection of eggs in which he had some eggs of the Lesser Spotted Woodpecker, *P. minor*. Being naturally curious to see the nest (or what remained of it) from which the eggs had been taken, my friend took me lately to see it. After walking out of Bath for about two miles, we came to a long avenue of beech-trees. In one of these, a very decayed tree, the nest was bored about nine inches into the trunk. The entrance was, so far as I could judge, between seven and eight feet from the ground. The birds had commenced another boring higher up the tree, but they left it unfinished. I think the wood was softer lower down the trunk. From this nest four eggs were taken, about the end of June. The tree was close to the roadside, and on being struck with a stick the hen bird flew off the nest, and both birds were seen about the adjoining trees. I saw a female Lesser Spotted Woodpecker in the flesh, which had been shot about a week ago in one of the suburbs of Bath, but I have never observed one alive in the wild state.—C. B. HORSBRUGH 4, Richmond Hill, Bath).

Swallows in December.—In 'The Zoologist' for Feb., 1881, details were given of the occurrence of Swallows and Martins in the South of England on the 7th, 11th and 18th of December, 1880. In December, 1885 (about the third of the month), a Swallow was seen on Clifton Down, close to the river, as reported by Mr. E. Clutterbuck (Zool. 1887, p. 269). In December, 1891, Swallows were seen at Retford on the 3rd, Norwich on the 10th, and Findhorn Bay, N.B., on the 12th, while House Martins were observed at Norwich on Dec. 3rd. (See an article on "Belated Swallows" in 'The Field' of Jan. 30, 1892.) And now once more, in December, 1894, we have to record the appearance of a few loiterers, or individuals of late broods, which were unable apparently to join the majority on their autumnal migration. On Dec. 1st, as reported by the Rev. Prebendary Gordon, of Harting Vicarage, Sussex, a Swallow was seen at Fishbourne. In Gloucestershire on the same day, Mr. C. H. Witchell saw a young Swallow flying about at Stroud, although in the shade the ground was white with frost. In Lincolnshire, on the same day, as well as on Dec. 2nd, a Swallow was seen by Mr. S. E. Harrison, of Roughton, "flying to and fro over his farmyard, and about the pond and buildings, as in summer." On the 3rd and 5th two or three were observed at Bognor. On Dec. 4th Mr. A. B. Percival reported that he had just examined, "in the flesh," a young House Martin, which had been obtained near Derby. On Dec. 5th a House Martin was shot by Mr. H. Butler, of Bournemouth, at Whitecliff Farm, Swanage. On Dec. 6th Mr. T. Lewis, of Brook Villa, Falmouth, saw eight or ten Swallows skimming about, and watched them for an hour or more. The circumstance was considered the more remarkable because the weather for some time had been cold and the wind north-east. On the 7th three Swallows were noticed at Chichester, and one at Bognor. On the 8th and 10th a few House Martins appeared at Fishbourne, and on the 11th one was seen at Arundel, where on the 15th a solitary Swallow was noted. At Sittingbourne, Kent, on the afternoon of Dec. 12th, one of these birds was observed flying to and fro over some fields, actively engaged, apparently, in hawking for insects. The day was very mild, though there was not much sunshine, and the air seemed full of insects. At Fishbourne, in Sussex, a solitary Martin was seen on the 17th, and three more on the 22nd. Finally, on the 23rd of the month, the latest report of a December Swallow reaches us, also from Sussex, a single bird having been seen on that date at Chichester. With these and other instances before us, reported by independent witnesses in different parts of the country, it is clear that in future it will not do to write about the late stay of Swallows in November, although it is of course true that the majority of these birds quit our shores even before November has set in.—J. E. HARTING.

Ivory Gull and Dusky Shearwater in Iceland.—I have the pleasure of adding two more birds to the Iceland list, not hitherto (so far as I am

aware) recorded in it. I heard some years ago that a small white gull came occasionally with the Greenland ice to the north coasts of Iceland, at the same time as the Polar Bears do. My collector procured one for me after a good deal of trouble, and it is, as I suspected, an Ivory Gull, *Pagophila eburnea*, a fine adult bird. On July 25th last, about sixty miles S.E. from Eskifjördr, a black petrel flew close to me (within ten yards, certainly) as I was standing on the deck of the Danish mail steamer 'Thyra,' and continued to circle round the ship for some time. I had no hesitation in putting it down as the Dusky Shearwater, *Puffinus griseus*. I described it in my notes at the time as something short of a foot in length; expanse of wing nearly two feet; colour sooty black; bill slenderer than a Fulmar's and much hooked. I saw another in the Axarfjördr (N.E. coast of Iceland) two days later; and an observant fellow-passenger, to whom I had pointed out these two on the wing, assured me afterwards that he had seen another on the west coast. There is nothing improbable in the occurrence of the Dusky Shearwater in Iceland, and I expect that further investigation will show that it breeds there in small numbers. I may add that I have been (for some eight years) collecting materials for an annotated list of Iceland birds, with the recent additions, and that any information on the subject from brother ornithologists will be most welcome. But I shall have to make yet another personal visit at least to the island before I shall be in a position to finish it.—HENRY H. SLATER (Thornhaugh Rectory, near Wansford).

Hybrid Swans.—Some three years ago, Mr. Assheton Smith, of Vaynol Park, Bangor, received in exchange from the Zoological Society's Gardens, Regent's Park, a female American Trumpeter Swan, *Cygnus buccinator*. This bird was placed upon a pool with other water-fowl, amongst which was a male Mute Swan, *C. olor*, with which in course of time it paired. Since then three broods of hybrid cygnets have been reared, and during a visit to Vaynol in October I had daily opportunities, for a fortnight, of inspecting them. The cygnets of 1894 were, of course, still in the grey immature plumage, but the young birds of the previous brood were then almost as white as their parents. In the carriage of the head and neck they resemble the female parent, *C. buccinator*, and the bill (which in the latter is wholly black) is black from the base to within an inch or so of the extremity, where it then becomes flesh-colour. There is, moreover, no prominent tubercle at the base of the bill, which is so conspicuous in the Mute Swan. The period of incubation was not precisely noted, but it was believed to be rather less than six weeks, the number of the brood being five in 1893, and six in 1894. As the American Trumpeter Swan has long been introduced into this country, and is even said to have been met with in a wild state on the Suffolk coast ('Handbook of British Birds,' p. 155), it is not surprising that, under favourable conditions, it should sometimes breed here; but I

have not found any instance on record of its interbreeding with *C. olor*.—
J. E. HARTING.

Ornithological Notes from Sussex.—In the first week of October two adult Red-throated Divers, with red throats, were shot off the Fish-market, Hastings. About October 18th an adult female Long-tailed Duck was shot from a pond at Ashburnham, near Battle, about seven or eight miles from the sea. On Oct. 22nd I had offered to me three young Sheldrakes, shot out of a flock of five on the previous day at Pett Level, near Winchelsea. On the same day a young male Shag, *Phalacrocorax cristatus*, was shot at the bottom of Ecclesborne Glen. On Nov. 8th I had brought to me a Fork-tailed Petrel, washed up dead opposite the Marina at St. Leonard's; its gizzard contained a small seed only.—G. W. BRADSHAW (Hastings).

MOLLUSCA.

Colpodaspis pusilla on the Devonshire Coast.—At a meeting of the Zoological Society, held on Nov. 20th, Mr. W. Garstang read a paper on this rare Gastropod mollusc, a specimen of which had been found by him near Plymouth. The anterior part of the foot was not really bifid, as stated by Sars, but possessed a pair of the large prolongations of its antero-lateral angles, analogous to the anterior pedal cornua of many *Æolids*. In this case, however, they were probably to be regarded as homologous with the pleuropodial expansions of the Tectibranchia. The bulloid shell, the radula, and the posterior appendage of the mantle pointed to the close affinity of *Colpodaspis* with the Cephalaspidea; but the great extent of the mantle, the small head, and the grooved tentacles were important and primitive characters which it shared with the Notaspidea. Whether *Colpodaspis* was an immature stage of some *Philine*-like genus or not, it furnished an indubitable connecting link between these two great subdivisions of the Tectibranchia.

SCIENTIFIC SOCIETIES.

LINNEAN SOCIETY OF LONDON.

December 6th, 1894.—Mr. C. B. CLARKE, F.R.S., President, in the chair.

Mr. Walter Tothill was elected a Fellow.

Mr. E. M. Holmes exhibited and made remarks upon a small collection of Japanese Marine Algæ, some of which were of considerable rarity in European collections.

Prof. D. Campbell brought forward some illustrations of the relations of Vascular Cryptogams as deduced from their development. His remarks, which were listened to with great attention, gave rise to an interesting

discussion, in which Prof. Bower, Dr. D. H. Scott, Mr. Carruthers, and Prof. Marshall Ward took part.

"A new revision of the *Dipterocarpeæ*," was the title of a paper by Sir Dietrich Brandis, K.C.I.E., who gave an excellent account of this order of forest trees, and their structure and mode of growth, together with a survey of the literature relating to them, and a clear exposition of his views concerning classification. He pointed out that the order *Dipterocarpeæ* consists almost entirely of large trees which do not flower till they have attained a great size, with a spreading crown on a branchless stem often more than 100 feet high. Hence it is difficult to obtain complete specimens in flower and fruit; and this explains why a large proportion of the genera and species have only of late years become accurately known. Notable species are the Sâl tree of India, *Shorea robusta*, great forests of which extend along the foot of the Himalayas and in Central India; the Eng tree, *Dipterocarpus tuberculatus*, of similar growth, in Burma; and others found in Cochin China and Borneo.

Dec. 20th.—Mr. C. B. CLARKE, F.R.S., President, in the chair.

Mr. Peter Ewing, of Glasgow, was elected a Fellow.

Mr. W. B. Hemsley exhibited a series of specimens and figures illustrating the parasitism of *Loranthus aphyllus* and other plants from the Herbarium, Kew.

Mr. J. E. Harting exhibited a specimen of a small Siberian Warbler, *Phylloscopus superciliosus*, which had been obtained near Beverley, Yorkshire, in October last, and made some remarks on its haunts, habits, and migrations, and upon the previous instances which had been noted of its accidental occurrence in the British Islands.

Mr. H. M. Bernard gave the substance of a paper on the spinning glands in *Phrynus*, not previously known, and described their position and their morphological importance in Arachnidan phylogeny. The penis was described as a pair of rudimentary filamentous appendages of the genital segment, and consequently of importance as bearing further testimony to the view that the limbs on the abdomen of the ancestral form were not plates as in *Limulus*, but appendages like those on the thorax. The presence of these limbs explains the curious genital operculum of the *Pedipalpi*, which is not a primitive feature derived from Eurypterine ancestors, as some would maintain, but a purely secondary specialization acquired within the Arachnid phylum.

A paper was then read by Mr. Percy Groom, entitled "Contributions to the Knowledge of Monocotyledonous Saprophytes," or plants which are dependent for their existence on the presence in the substratum of decaying organic matter. He observed that, like parasites, they may be divided into those which possess chlorophyll (*hemisaprophytes*) and those which have none

(*holosaprophytes*). Hitherto very few experiments, he said, had been made on *hemisaprophytes*, and hence our acquaintance with them was largely speculative. The remarks which he had now to offer referred almost entirely to *holosaprophytes*, or at least to plants with very little trace of chlorophyll. After an interesting discussion, in which Sir D. Brandis, Mr. H. N. Ridley, and others took part, the meeting adjourned to Jan. 17th.

ZOOLOGICAL SOCIETY OF LONDON.

November 20th, 1894.—Sir W. H. FLOWER, K.C.B., LL.D., F.R.S., President, in the chair.

The Secretary read a report on the additions that had been made to the Society's Menagerie during the month of October, and called special attention to a pair of Somali Ostriches, *Struthio molybdophanes*, from Somaliland, purchased Oct. 26th. This was the first pair of the blue-skinned form of Ostrich, which inhabits Eastern Africa, that had reached the Society's Gardens.

On behalf of Dr. C. Kerbert, Director of the Zoological Gardens, Amsterdam, a photograph was exhibited of a Sumatran Goat-Antelope, *Nemorhædus sumatrensis*, living in those Gardens.

Mr. R. Lydekker exhibited and made remarks on a model and a photograph of a bird's egg from Patagonia, supposed to be the egg of an undescribed species of Ratite bird.

Mr. W. B. Tegetmeier exhibited and made remarks on the felted covering of a long-haired Angora Rabbit, which had shed its entire coat in one piece.

The President exhibited a specimen of a Hairy Armadillo, *Tatusia pilosa*, obtained by J. Kalinowski in the Maraynioc district of Central Peru.

Mr. F. G. Parsons read a paper on the anatomy of *Atherura africana*, compared with that of other Porcupines. In addition to the points mentioned by Drs. Gray and Günther as differences between the skulls of *A. africana* and *A. macrura*, the arrangement of the fronto-nasal suture, the position of the maxillomalar suture, and the frequent presence of an *os anti-epilepticum* were noticed. The presence of intercentra was also drawn attention to. The muscles in the main bore out the remarks already published by the author in his paper on "The Myology of the Sciuromorphic and Hystri-comorphine Rodents." The liver agreed with that of *Hystrix cristata* and *H. javanica* in having the left central lobe divided into two. There was no gall-bladder. The lungs were specially remarkable for being divided up into a large number of lobes, there being 34 lobes on the left side and over 40 on the right.

A communication from Mr. J. T. Cunningham treated of the significance of diagnostic characters in the *Pleuronectidæ*. In this paper the specific and generic characters of the so-called Top-knot (*Zeugopterus*) were first

considered. The principal generic characters were the perforation of the gill-septum, found also in *Arnoglossus megastoma*, and the prolongation of the dorsal and ventral fins on to the right side at the base of the tail. The marked peculiarity of habit was that of adhering to vertical surfaces. It was shown that this was independent of either of the characters mentioned, and was due to the pumping-action of the longitudinal fins and their muscles posteriorly, the enlargement of those parts being also a generic character. No evidence of the utility of the specific characters could be discovered. The characters of other *Pleuronectidæ* were similarly examined, and the conclusion reached was that there are two kinds of characters, the adaptive and the morphological.

Mr. A. Smith Woodward read a description of the so-called Salmonoid fishes of the English Chalk, dealing with the osteology of *Osmeroides lewesiensis*, *Elopopsis crassus*, and *Aulelepis typus*. He directed special attention to three features in the head of the genera to which these species are referred, namely: (1) the exclusion of the supraoccipital from the cranial roof by the union of the parietal bones in the median line; (2) the overlapping of the arched maxilla by two large supramaxillary bones; and (3) the presence of a large gular plate. All these characters separated the fishes in question from the typical *Salmonidæ*, while the first and third distinguished them from typical *Clupeidæ*. All three genera should be associated with the existing *Elops*, *Megalops*, and their allies.

Mr. W. Garstang read a paper on the Gastropod *Colpodaspir pusilla* of Michael Sars, describing a specimen of this rare mollusc found by him at Plymouth in the early part of the year. (See p. 25.)

A communication from Mr. A. D. Bartlett gave an account of the recent occurrence in the Society's Menagerie of a case of one Boa swallowing another of nearly equal size.

A communication from Prof. R. Collett contained a description of a new Agonoid fish from Kamtschatka proposed to be called *Agonus gilberti*.

Dec. 4th.—HENRY SEEBOHM, F.L.S., F.Z.S., Vice-President, in the chair.

The Secretary read a report on the additions made to the Society's Menagerie during the month of November, and called attention to the Surinam Water-Toads, *Pipa americana*, presented by Mr. F. E. Blaauw; to a fine example of Pels' Owl, *Scotopelia peli*, from Sierra Leone, presented by the Hon. C. B. Mitford, Deputy-Governor of the Colony; and to two Tree-Kangaroos from Queensland, received in exchange.

A communication was read from Mr. T. Manners Smith on some points in the anatomy of the Water-Mole, *Ornithorhynchus paradoxus*, relating chiefly to the muscular anatomy and the trunk-arterial system.

Mr. F. E. Beddard read a paper on certain points in the visceral anatomy of the same animal.

Mr. Boulenger read a "Second Report on Additions to the Lizard Collection in the Natural History Museum." It contained a long list of species previously unrepresented in the collection, specimens of which had been acquired since the appearance of the first Report, published in the 'Proceedings' of the Society for 1890. This list was supplemented with the descriptions of several new species.

Prof. F. Jeffrey Bell called attention to the acquisition by the Natural History Museum of some specimens of remarkable Corals of great size from North-west Australia, of which he showed some photographs.—P. L. SCLATER, *Secretary*.

ENTOMOLOGICAL SOCIETY OF LONDON.

December 5th, 1894.—H. J. ELWES, F.L.S., F.Z.S., President, in the chair.

Messrs. E. A. Bowles, M.A., of Myddelton House, Waltham Cross; E. C. Cotes, of the Indian Museum, Calcutta; Wolley-Dod, of Calgary, Alberta, Canada; Joseph W. Green, of West Lodge, Blackheath; Henry Keeble, of 10, Coleman Street, E.C.; and Thomas Turner, of Collumpton, Devon, were elected Fellows of the Society.

Mr. F. Merrifield exhibited hybrids belonging to the genus *Saturnia*, obtained by Dr. Standfuss, of Zurich, viz., a male and female hybrid from a male of *S. pavonia* and a female of *S. pyri*, to which he had given the name of *S. emiliae*; also hybrids from what Dr. Standfuss described as "a male of *Callimorpha dominula* var. *persona*" (received from Tuscany) and a typical form female of *C. dominula*, to which he had given the name of *C. romanovi*. Mr. Merrifield remarked that the so-called var. *persona* differed entirely from the type of *C. dominula*.

Mr. J. W. Tutt exhibited and read notes on specimens of a very small form of *Euchloë*, taken in Shropshire by the Rev. F. B. Newnham, who was of opinion that it was distinct from *E. cardamines*. He pointed out that it was much smaller than the latter species, and that the discoidal spot was placed, as in *E. turritis* and *E. gruneri*, at the juncture of the orange and white spaces, and not, as in *E. cardamines*, well within the orange tip. Mr. Tutt also exhibited and read notes on specimens of *Noctua dahlii*, from Cheshire, Essex, Yorkshire, Aberdeenshire, and other counties. The variation in the specimens was said to be partly due to sexual dimorphism, and partly to their geographical distribution.

Herr Jacoby read a letter received from Mr. Buxton Forman, one of the Assistant Secretaries of the Post Office, to the effect that the Postal Union had decided to make a rule not to allow natural-history specimens to be sent by sample post, which was intended for the transmission of *bona fide* trade-patterns or samples of merchandise, and consequently that the forwarding

of such specimens at the same rate would in future be irregular. Lord Walsingham stated that he had had a long correspondence with the Post Office authorities on the subject, and that the late Mr. Raikes, when Postmaster-General, promised him in 1891 that such specimens should, 'so far as the British Post Office was concerned, be transmitted at the same rates; and a letter to the same effect, from the late Sir Arthur Blackwood, when Secretary of the Post Office, was published in the 'Proceedings' of the Society for 1891.

Mr. C. G. Barrett exhibited, for Mr. A. J. Hodges, a specimen of *Hydrilla palustris*, from Wicken Fen; also specimens of *Caradrina ambigua*, from the Isle of Wight. He remarked that of the latter one specimen has the hind margin of the right fore wing indented, and the wing broadened as though from an injury to the pupa. In this wing the margins of the large orbicular and reniform stigmata had become so joined that the dividing lines had disappeared, and the stigmata were fused into one irregularly formed blotch.

Mr. McLachlan exhibited, for Mr. G. F. Wilson, F.R.S., of Weybridge, a "grease-band" which had been tied round trees to prevent the females of *Cheimatobia brumata* from ascending the trunks for the purpose of oviposition; the band was thickly covered with the bodies of the females, together with a few males.

Surgeon-Captain Manders exhibited a pair of *Cheloni bifasciata*, from the Shan States, and called attention to the "assembling" habits of the male, some hundreds of which were attracted by the numerous females which emerged from the cocoons at sunset.

Mr. B. A. Bower exhibited a beautiful variety of *Zygana lonicera*, Esp., having the spots confluent, taken at Chattenden Wood, North Kent, in June last; also a specimen of *Incurvaria tenuicornis*, Stn., taken at Chislehurst, in May, 1893.

Mr. H. Goss exhibited, for Mr. F. W. Urich, of Trinidad, a series of males, females, and workers of *Sericomyrmex opacus*, Mayr, a species of fungus-growing and fungus-eating ant.

Colonel Swinhoe read a paper entitled "A List of the Lepidoptera of the Khasia Hills," Part III.

Mr. C. J. Gahan read a paper entitled "On the Longicorn Coleoptera of the West Indian Islands."

Mr. F. W. Urich communicated a paper entitled "Notes on the fungus-growing and eating habits of *Sericomyrmex opacus*, Mayr."

Prof. E. B. Poulton read a paper, by Prof. E. B. Titchener, entitled "An apparent case of Sexual Preference in a male Insect."

The Rev. H. S. Gorham communicated a paper entitled "Notes on Herr A. Kuwert's 'Revision der Cleriden-gattung *Omadius*, Lap.'"—
H. GOSS & W. W. FOWLER, *Hon. Secretaries.*

NOTICES OF NEW BOOKS.

The Life and Correspondence of WILLIAM BUCKLAND, D.D., F.R.S., sometime Dean of Westminster, twice President of the Geological Society, and First President of the British Association. By his Daughter, MRS. GORDON. 8vo., pp. i—xvi; 1—288. London: John Murray. 1894.

DEAN BUCKLAND died in August, 1856, and shortly afterwards appeared a new edition of his 'Bridgewater Treatise' (on Geology considered in relation to Theology), edited by Professor Phillips. Prefixed to this edition is a Memoir of him by his son, the late Frank Buckland, and there is of course a notice in the 'Dictionary of National Biography;' but these articles do not convey more than an outline of the career of this distinguished man of science, and it has remained for his daughter, Mrs. Gordon, to give us a much fuller account of his life and work in a volume of nearly 300 pages, which is now before us.

Dean Buckland was a very remarkable man, whose influence was felt far beyond the University whose professorial chair of geology he occupied; far even beyond the limits of the British Islands, as shown (in the appendix to this volume) by the long list of foreign scientific societies of which he had been elected a member. So many years, however, have elapsed since his death that probably few persons beyond those who were personal friends and acquaintances have any adequate notion of the nature of the services rendered by him to posterity.

He was an eminently practical geologist, always turning to good account the scientific knowledge which he acquired. He lost no opportunity of pointing out the importance of applying a knowledge of Geology to the improvement of agriculture, and time has shown not only that his suggestions were valuable, as being founded on scientific grounds, but that many persons have made fortunes by adopting them. To take the case of phosphates, now so largely employed as manure: Dr. Buckland had shown that the so-called *coprolites* found in various rocks could not be anything but the fossil dung of extinct animals, as the intestinal marks were still visible. It was argued from this that they ought

to contain abundance of phosphate of lime, the most useful manure for exhausted soil. This proved to be true, and was the origin of the great industry of superphosphates which has done so much for agriculture. Dr. Daubeny thereupon suggested that when coprolites failed, mineral phosphates, such as he had seen in Estramadura, might be utilized, and from this source an enormous trade has since been developed.

Drainage was another matter to which Dr. Buckland paid special attention, and with remarkable results. By judicious draining he arrested the spread of ague in the villages on Otmoor, and materially improved the health of the inhabitants, in whom he was originally led to take an interest by reason of many of them being tenants of lands belonging to the Dean and Chapter. On coming into residence as Dean of Westminster, he at once had a great task before him in the cleansing of the old sewers (from which something like 400 cubic yards of foul matter was removed), and in the introduction of pipe drainage, which was the first of its kind ever laid down in London.

Other sanitary reforms followed, particularly in regard to the dwellings of the poor in Westminster, and the improvement of the water-supply of the metropolis. In 1848, on the outbreak of cholera, he rendered important aid by the information which he afforded on its prevention by care in sanitary arrangements, as well as on the properties of disinfectants, and the best modes of applying them.

His knowledge of the relative value of different building stones caused him to be often consulted by architects and surveyors, who were guided by his opinion, and this not only in London, but in the provinces. At Weymouth, for example, when the new breakwater was about to be constructed, the old one having suffered much damage by the *Pholas* boring into the limestone, Dr. Buckland recommended that Portland stone should be used, for the *Pholas*, he said, would not bore into it so readily, on account of the amount of *silica*, or flinty matter, which it contained. Thus did he practically turn to account the teachings of science.

The reference to stone reminds us of the many stories which have been circulated respecting the discovery of living toads in cavities of solid rock, in which, it is alleged, they must have been entombed for ages. Dr. Buckland made a number of experiments

to test the truth of these stories, and we may give the result in his own words:—

“Twelve circular cells were prepared in a block of sandstone, to each of which a plate-glass was fitted. Toads were then placed in these cells and buried beneath three feet of earth, where they were left for over a year. Every toad shut up in sandstone died; but the greater number of those in the porous limestone were still alive, though greatly emaciated; these were again shut up, and by the end of the second year every toad had died. I also enclosed four toads in holes cut in the trunk of an apple-tree, and closed the holes with a plug of wood; all these toads were found dead at the end of a year. It seems from these experiments to follow that toads cannot live a year totally excluded from atmospheric air, or two years entirely excluded from food. Admitting that toads are found in cavities of stone and wood, we may account for it by supposing that the toad seeks a cavity while in the tadpole state, and feeds on insects which, like itself, seek shelter within such cavities. It then becomes too large to leave the hole; but there is always some small crack by which air and food can come in to support life. This tiny aperture is very likely to be overlooked by workmen, who are the only people whose work on stone or wood leads them to disclose cavities in these substances. No examination is made until the toad is discovered by breaking the mass in which it was contained, and then it is too late to ascertain, without carefully replacing every fragment (and in no case that I have seen reported has this been done), whether or not there was any crevice or hole by which the animal may have entered the cavity.”

These experiments are not the only ones placed on record by the biographer. We must not forget the original steps which were taken by Dr. Buckland, in his attempt to discover the species of wild animal by which the prehistoric cattle of Yorkshire were killed and their remains dragged into the great cave at Kirkdale.* They might have been Bears, or Wolves, or Hyænas. The professor of geology thought the evidence pointed to Hyænas, and he set to work to prove his theory in a most ingenious way.

In the Kirkdale cave he had found a portion of a skull which he believed to be that of a young Hyæna, but not having an undoubted skull of this species with which to compare it, he applied to Dr. Burchell, the African traveller (after whom the so-called

*The bone cave of Kirkdale was discovered in 1821, in the Vale of Pickering, about twenty-five miles from York, and was the first fossil cave known in England.

"Burchell's Zebra" was named out of compliment), to procure for him a living animal; and after some difficulty and delay, this was done. The beast was sent to England, and was kept first at Exeter Change, and subsequently at the Surrey Zoological Gardens. On offering him bones of oxen, similar to those found at Kirkdale but taken from recently-killed animals, Dr. Buckland found that they were gnawed and cracked by him precisely in the same way. He cracked the marrow-bones, and refused the bones which contained no marrow, exactly as did his ancestors ages before him in the wilds of Yorkshire. So wonderfully alike were these bones in their fracture that, judging from this point alone, it was impossible to say which bone had been cracked by the living Hyæna and which by the aboriginal of Kirkdale.

This Hyæna would have been killed in the cause of Science for the purpose of examining his skull, but the skull of a young Hyæna having been procured from another source, it was found on comparison that Dr. Buckland's views were correct.

Another ingenious experiment was that which he made with a view to determine the species of an unknown animal whose *foot-prints only* were visible on a slab of sandstone which had been sent to him from Scotland for examination. After some reflection, it occurred to him that these footprints resembled in some respects the impressions which might be made by the feet of a Tortoise. Acting at once on the impulse of the moment, he called his wife to come down and make some paste, while he went out to search for and bring in a living Tortoise from the garden. On his return he found the kitchen table covered with paste, upon which the Tortoise was placed, when to his great delight he found his suspicions confirmed. In its attempts to escape, the animal made tracks which were comparable to those which were imbedded by some remote ancestor on the block of sandstone.

Facts like these, expounded in his own peculiar manner, always earnest and enthusiastic, carried conviction with them, and made his lectures extremely popular. His auditors caught his enthusiasm, and the study of geology became the fashion.

The popularity of the British Association for the Advancement of Science, of which after its formal inauguration at Oxford he was elected President, is said to have been due in a great measure to his untiring industry and the spirit which he infused into the undertaking. As observed by Prof. Boyd

Dawkins, who has written a Preface to the volume before us, whatever estimate may be formed of his life and works, it cannot be denied that he was one of the makers of modern Oxford, and one of the founders of geology. Further on (pp. 55-56), writing of the traditions of his teaching which he found on going up to Oxford in 1857, and on the value and influence of his works, particularly his 'Bridgewater Treatise,' and his 'Reliquiæ Diluvianæ,' he observes:—"In my own person, therefore, I can speak of the great influence which Dr. Buckland's work has had on me. I shall never cease to venerate his name. His books still, in my opinion, belong to the classics of geology, although, of course, during the last seventy years, the theories as to the Deluge, and the doctrine of Final Causes, have changed. The facts, however, have not changed; and for the Reptiles, the Stonesfield Mammalia, and the Pentacrinoids, I still use as a class-book the last edition of the 'Bridgewater Treatise,' edited by Prof. Phillips."

With this authoritative expression of opinion we may close a volume which no young naturalist of the present day should neglect to read. It is not only very entertaining, but also highly instructive, reminding us, more forcibly than any book which we have read for some time past, of the well-known lines of Longfellow:—

"Lives of great men all remind us
We can make our lives sublime;
And, departing, leave behind us
Footprints on the sands of time;
Footprints, that perhaps another,
Sailing o'er life's solemn main,
A forlorn and shipwreck'd brother,
Seeing, shall take heart again."

The allusion in these lines to the "footprints" makes them singularly applicable to the subject of this memoir.

Allen's Naturalists' Library. Edited by R. B. SHARPE. *A Handbook to the Marsupialia and Monotremata.* By RICHARD LYDEKKER. Crown 8vo, pp. i.—xvi; 1—302. With 38 coloured plates. London: W. H. Allen & Co. 1894.

In a well-written Introduction to this volume, Mr. Lydekker points out the chief features which characterize the Marsupial

or pouched animals and distinguish them from the higher orders of the placental mammals; laying particular stress, of course, upon the absence of a placenta; upon the form and function of the pouch as a receptacle for the young; upon the imperfectly developed condition of the young at birth; upon the peculiar modification of the breathing organs to prevent the danger of choking by the forced injection of milk from the teat to which it adheres; and upon the relatively small size of the brain in proportion to that of the head and body, with comparatively few convolutions, indicating a low order of intelligence in these animals. The marked peculiarity in regard to the succession of the teeth is also referred to as characteristic of the Order.

The Marsupials have adapted themselves to almost all modes of life; some, like the Thylacine (or so-called "Tasmanian Wolf") running in the ordinary manner; some, like the Kangaroos, progressing on the ground by long leaps; others, like the tree Kangaroos, arboreal; others, again, like Phalangers, volant, after the manner of Flying Squirrels; while a single species (*Notoryctes*) pursues a subterranean, Mole-like mode of life. It is remarkable that, so far as is known at present, there is no Australian Marsupial which is aquatic in its habits. The reason for this, no doubt, is the fact that such a habit in a pouched animal would be fatal to its existence, for unless it periodically resided altogether on land, the young in the pouch would be drowned by its immersion. The present state of development in the Australian Marsupials, according to Mr. Lydekker, is nothing to what it was during the Pleistocene or latest geological epoch, for we find at that period evidence of the existence of giant Kangaroos and Wombats (to say nothing of extinct forms which have no living representatives), by the side of which the largest existing species would appear almost dwarfs! The cause of this universal extinction of the most gigantic mammals throughout the world soon after man had made his appearance, is one of those problems which have not yet received a satisfactory answer, for, as Mr. Lydekker remarks, not even a glacial period could have made a clean sweep of the whole globe.

In regard to the present distribution of the Marsupials we are disappointed at the paucity of information given in this volume. We have searched in vain for statistics on several

points upon which a few details would be interesting to the uninformed reader. To begin with, we are not told what constitutes the difference between a Kangaroo and a Wallaby, nor what is the derivation and meaning of the latter name. Presumably, like the former, it is of native origin; but if there are any tangible characters by which a Wallaby may be always distinguished from a Kangaroo, it might have been well to point them out. A table of classification would have been a useful addendum to the Introduction. Then we should like to know what is the number of species of *Macropodidæ* at present known to exist, and how many of them have been made known and described since the publication of that epoch-making work, Gould's 'Mammals of Australia,' which was completed in 1863. Their respective distribution in Australia and New Guinea is another point upon which some information would be acceptable, as well as on the question whether there is any species common to the two countries. Probably not; though there may be some which are very closely allied. Again, looking to the physical aspect of Australia, and to the existence of great central deserts—which seem (in the case of man at all events) to create an almost insuperable barrier to overland communication, say between East and West, or between South and West—one would like to know whether any of the *Macropodidæ* find their way across Central Australia, or what are the limits of distribution so far as has been ascertained.

In regard to the habits and mode of life of the Australian and New Guinea mammals there is a woful lack of information; and it is little less than a reproach to those who write about them, that they have not collected more facts from colonists who, dwelling amongst or within measurable distance of these, to us, unfamiliar creatures, could tell us, if they would, a great deal more than we now know about them. We already hear of the threatened extinction of certain species whose skins are exported by the thousand to the London market; and it would seem as if some of them were to pass away, leaving us with little more knowledge concerning them than we possess in regard to forms already extinct. This surely ought not to be. The members of such scientific societies as have been long formed in Australia and Tasmania, and more particularly the staff of the Australian Museum, Sydney, should find opportunities for supplying this

needed information. Indeed, unless we are much mistaken, they have long been engaged in that direction, yet we do not find any quotation of the results, or extracts from their published 'Proceedings' or 'Transactions.' Even in the case of an animal like *Ornithorhynchus*, on which so much has been written during the past ten years, the reader is expected to be satisfied with a reprint of the observations made by Dr. George Bennett, so long ago as 1829-32, while the later researches of Ray Lankester, Flower, P. H. Macgillivray, Turner, Caldwell, Poulton, Pritchard, Stewart, Gill, Cope, Thomas, and others, are altogether passed over in silence.

A few pages of bibliography would have formed a most useful appendix to the volume, and, indeed, in a work supposed to be "up to date," should have been supplied. Mr. Lydekker has contented himself too much with classification, synonymy, and technical descriptions, while the coloured figures which are given are those of species which (with few exceptions) were known forty years ago, when these old plates were first published. It would have been far more satisfactory to have given new plates of species which have come to light since Gould's time. To be progressive, what we need is good figures of new species, or better figures of old ones than at present exist. Both, indeed, would be desirable, if publishers were only more enterprising, and authors more firm in their advice.

In the preparation of the letterpress Mr. Lydekker's labours have no doubt been lightened by his adoption of the classification and nomenclature given by Mr. Oldfield Thomas, in his excellent 'Catalogue of the Marsupials in the Collection of the British Museum,' published in 1888; but he has brought his work up to date by including in their proper places the species which have since then been described. Amongst these, perhaps the most noticeable is the curious Mole-like Marsupial *Notoryctes typhlops*, which was originally described by Dr. Stirling, in the 'Transactions of the Royal Society of South Australia in 1891.' As Dr. Stirling's account of its habits has been already printed in 'The Zoologist' (1891, p. 393), it will be unnecessary to repeat what is there stated, though we may observe that Mr. Lydekker gives some additional details of interest which have recently come to light. The coloured plate which he gives of this animal is a useful addition, although it has been unfortunately misplaced,

having been inserted amongst the *Echidnas*, opposite page 240, instead of where it should be, opposite page 188. This is not the only instance in which we have noticed the faulty arrangement of the plates. At page 240 we should find the plate of *Echidna*, but this, for no apparent reason, is relegated to page 280; the *Wombat* faces page 160 instead of page 124; the *Kola* should face page 78 instead of page 88; and the *Thylacine* should figure amongst the *Dasyurinae* at page 150, instead of being inserted amongst the *Opossums* at page 200. These, and other cases which might be mentioned, are, to say the least of it, embarrassing to the reader, though they may be remedied, of course, by re-arrangement in subsequent issues, or by re-binding.

Allen's Naturalists' Library. Edited by R. BOWDLER SHARPE.
Butterflies: by W. F. KIRBY. Vol. I., crown 8vo, pp. i-lxxiv,
 1-262, with 37 plates. London: W. H. Allen & Co. 1894.

IN treating of a subject so large as the present, the author is naturally under considerable difficulty in compressing his matter into two volumes of this size, and at the same time doing justice to the many species of which he writes. He has therefore taken in their order each subfamily, with its genera, and described the type butterfly only of each genus, omitting the various species; this reduces the work to reasonable proportions. In some instances, for special reasons, he describes more than one species; and in the case of British species describes all, in order, to use his own words, "to make the British butterflies illustrate and lead up to a study of the butterflies of the world." With each species he gives a copious synonymy.

In an Introduction of 74 pages the external structure and characters of the eggs, larvæ, pupæ, and perfect insects are described, with many interesting details, special attention being paid to neuration. The author adopts Sc Slater's scheme of geographical distribution, and in connection with this makes the following interesting statement:—

"It is a mistake to suppose that the Tropics are always rich in butterflies, or that all tropical butterflies are beautiful. In proportion to the productiveness of a country in a state of nature, is often its unproductiveness when cleared and cultivated. Not only are thousands of

tropical butterflies as small and dull-coloured as the most inconspicuous of our own, but the Indian representatives of European or Japanese species are often much inferior to the latter in both size and beauty."

Mr. Kirby makes a special feature in this book of Classification: he discusses and compares in detail the various methods and systems, giving his reasons for his own particular view in each instance. It makes one wish for the day when one permanent nomenclature shall be universally adopted.

One cannot help a feeling of regret that a more detailed description of the habits of the insects is impossible, owing to want of space; but the author has succeeded in getting a considerable amount of information into the book. A noteworthy feature of the work is that the author gives the origin of names and terms when of any interest; thus the Glanville Fritillary is said to have been named after Lady Glanville of Glanvilles Wootton, in Dorsetshire, where the insect was first taken.

The Plates, which are copious, are also a feature of the book, and as a whole answer their purpose, and are fairly true to nature. Some are not up to the standard of the majority—i. e. Plates XXXIII. and XXXIV. are not to be compared with that of *Apatura iris*, which is excellent. The numbering of Plate I. is obviously not in keeping with the text. All the English species so far treated of, including the *Nymphalinae* (*Argynnis*, *Vanessa*, *Melitæa*, &c.), *Apatura*, and *Satyrinae*, are figured, and in addition to the types of genera there are a few plates of recently described and hitherto unfigured foreign butterflies. We cannot help regretting that room is not found for a plate of that important and extremely interesting butterfly *Araschnia levana* in its various stages, which surely deserves a place.

Many woodcuts of varieties, under-sides, pupæ, &c., are also given.

We cannot take leave of this book without expressing our admiration of the clear and concise method of arrangement throughout. The book is printed in an attractive style, and should find many readers both amongst beginners and also amongst more advanced students of Entomology.